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Notes on the Orange Leaf Scab.*

By F. LAMSON SCRIBNER, U. S. Dept. Agriculture.

Last summer, and also during the present season, there have been received at the Department of Agriculture Orange leaves that were diseased or injured through the action of some agency not yet well understood.

Mr. Chas. W. Campbell, writing from Ocala, Florida, July 29th, 1886, says that "the disease first made its appearance last summer and seems to be increasing the present season, particularly on young trees making vigorous growth. It seems to be confined to sour stocks, although this season it has appeared on Lemon trees. No sweet Orange trees have been affected, nor the sweet buds on sour stocks, even when growing side by side with trees badly affected. It is very destructive to the growth of trees, and ruinous to young nursery stocks, so that fears are entertained that it will seriously affect the Orange interest unless means are discovered for checking it. Last season and this have been exceedingly wet, and the appearance of the fungi may be due to this fact."

I desire to call attention to this subject more especially because there seems to be no literature upon it, and there is a probability that the disease in question is new; it is at least, of very recent appearance in Florida. The samples received exhibit a malady of a serious nature; one certainly deserving careful investigation. The entomologists affirm that there is no evidence nor probability of its being caused or induced by insects.

* Read before the Botanical Club of the A. A. A. S., Buffalo Meeting, August, 1886.

There first appears upon either the upper or lower surface of the leaves, more particularly upon the latter, and upon the young shoots, small, light colored wart-like excrescences. These excrescences increase in number and size, the approximate ones often running together, until the whole surface is covered, destroying, of course, the vitality of the leaf. When young leaves are attacked they become more or less distorted, and their full development is prevented. The top of the older warts, if one may so term them, are dark brown, or nearly black, due to the presence of a dense fungus growth, which exhibits under the microscope, a multitude of irregularly developed conidiophores, bearing oblong, oval one-celled conidia. Such low forms as here presented are almost unnameable, and are quite beyond definite classification, yet they are often among the most injurious of fungi; but whether this particular fungus be the cause of the disease it accompanies I cannot at present say. Upon some diseased specimens recently received from Ocala, Fla., there was discovered a species of *Fusarium*, which Mr. J. B. Ellis, to whom samples were submitted, believes to be identical with *F. sarcochroum*, Desm., and he expresses the opinion that the tubercles are caused by the mycelium of this fungus, these being the first outward manifestations of its growth.

It may be going too far to advance any opinion at this time, but I will say that after making many careful examinations of the samples received, I am disposed to think that the injury in question is occasioned by the first fungus referred to above, the hyphae and spores of which are present in greater or less abundance on all the more developed excrescences.

From letters received from Mr. C. F. A. Bielby, of De Land, Fla., we learn: *First*—That the trees most severely affected with this leaf disease last season suffered more than those not affected, during the winter. *Second*—Trees affected last season are the ones first attacked this spring, although the foliage of these is entirely new growth. *Third*—So far as observed, sour trees alone are affected. *Fourth*—Location and nature of the soil, or of the fertilizers used, have no influence on the disease. *Fifth*—The most vigorous as well as the “sickly” trees are alike affected. *Sixth*—If a tree is diseased in part the tendency is for

the whole tree to become so. *Seventh*—The malady does not appear to spread in the grove, but may occur at several points simultaneously. The evidence of these facts points to a fungus origin for the disease.

REMEDIES.—The application of the following are recommended for trial as having fungicidal properties: *First*—A solution of bisulphide of potassium, $\frac{1}{2}$ ounce to a gallon of water. *Second*—“Liquid grison,” prepared by boiling 3 lbs. each of the flowers of sulphur and lime in 6 gallons of water until reduced to 2 gallons. When settled, pour off the clear liquid and bottle it for use. For use mix one part of this clear liquid in 12 gallons of water. *Third*—To 10 gallons of strong soap suds add about a pound of glycerine and one-half pint of carbolic acid.

These solutions should be applied in the form of a fine spray to the diseased trees. As intimated, what action they may have towards arresting the malady can only be determined by experiment.

Pinus monophylla and *Pinus edulis*.

In the BULLETIN for May, 1885, I published a note on my observations on *Pinus edulis* and *Pinus monophylla* in the far West. By these observations I was convinced that *Pinus monophylla* is but a variety of *P. edulis*, a variety confined to the more arid portions of the area it occupies; and I was led to consider *P. monophylla* as a desert plant, in which the leaves are consolidated to diminish their surface area; following the example of *Cactus*, *Holacantha*, *Canotia*, *Ephedra*, etc.

I am sorry to see from a note in the Gardeners' Chronicle of July 31st, that Sir Joseph Hooker does not accept my view of the case. He says, of my article, that “it reads well, but is not supported by facts.” Now, with due respect to the great botanist whom we all delight to honor, I am compelled to appeal from his decision. If he could have had my experience, and had himself observed the facts from which I infer the specific identity of the two forms, I am quite sure he would accept the view I have advanced. It happens that I have spent two full years in the region occupied by the pines under consideration, and during that time I traversed nearly their entire habitat, viz., Nevada, Utah, Colorado, New Mexico, Arizona and Chihuahua. As botanist of the